REMARKS/ARGUMENTS

Claims 33-35 and 44-56 are pending in the present application. Claims 33, 44 and 46 are independent. Applicant has canceled claims 47 and 48 and inserted the limitations of the claims into the independent claims 33, 44 and 46. Applicant has also amended claim 49 to depend on claim 46 instead of canceled claim 47. No new matter is added.

Claim Rejections under 35 U.S.C. § 103

The Examiner has rejected claims 33-35 and 44-56 under 35 U.S.C. §103 as being obvious over U.S. Patent No. 6,073, 683 to Osakabe et al. ("Osakabe") in view of U.S. Patent No. 3,644,110 to Sendt (hereinafter "Sendt").

Applicant has amended the independent claims to include the following limitation:

…wherein said molding surface comprises a separating wall or walls having a **substantially uniform thickness** through all of the wall or walls **through which cooling is effected** and wherein **the level of the liquid is sufficient to cover all of said at least one area including said wall or walls** of the chamber from which heat is to be taken and wherein…

Osakabe discloses a cooling apparatus comprising a refrigerant tank which is placed adjacent to a radiating plate of a heat generating object. (Oskabe, Abstract). The Examiner acknowledges that Osakabe does not teach a mold. However, the Examiner states that Osakabe teaches a heat generating unit to which a cooling apparatus is attached and in addition, states that Sendt teaches a tool being a mold element including a cooling arrangement in a closed chamber. The Examiner further argues that it would have been obvious for one of ordinary skill in the art to recognize the cooling apparatus of Osakabe could be utilized for cooling elements to other heat generating units such as a mold as taught by Sendt.

Claim 33 as amended reads:

A method of uniformly cooling of a molding surface of a mold for dies and molding of articles using dies wherein the mold comprises at least one completely closed chamber having air substantially removed therefrom and having a single quantity of liquid therein which extends to cover at least one area adjacent to and on an opposite side of the molding surface of said mold, wherein said molding surface comprises a separating wall or walls having a substantially uniform thickness through all of the wall or walls through which cooling is effected and wherein the level of the liquid is sufficient to cover all of said at least one area including said wall or walls of the chamber from which heat is to be taken and wherein each of said at least one completely closed chamber being integrated within the mold and a space above the single quantity of liquid and within the completely closed chamber in which pressure within the space is caused to be set at a level which will enable the single quantity of liquid to boil at a selected temperature, said selected temperature being at a level such that the temperature is below a temperature of the at least one area adjacent to the molding surface this being by reason of, as a first step, **filling of the completely closed chamber with the single quantity of liquid and then extracting a selected portion of the single quantity of liquid without allowing air to replace the extracted liquid**, and passing at a selected cooling temperature, the single quantity of liquid through condensing means to effect, by such cooling, condensation of vapor of the single quantity of liquid in the space to return the condensed vapor to the single quantity of liquid by gravity.

Applicant respectfully submits that Osakabe does not disclose "A method of **uniformly cooling of a molding surface of a mold** for dies and molding of articles using dies wherein the mold comprises at least one completely closed chamber **having air substantially removed** therefrom and having a single quantity of liquid therein which extends to cover at least one area adjacent to and on an opposite side of the molding surface of said mold, wherein said molding surface comprises a separating wall or walls having a substantially uniform thickness through all of the wall or walls through which

cooling is effected and **wherein the level of the liquid is sufficient to cover all of said at least one area including said wall or walls of the chamber from which heat is to be taken**…"

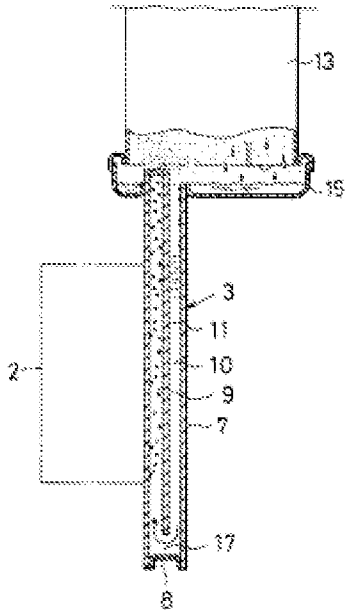
Rather, Osakabe states at Col. 8, ll. 38-40:

"The boiling refrigerant rises as **air bubbles** through the vapor passages 9 and enters the lower tank …". Osakabe does not contemplate use of a vacuum at all.

Applicant respectfully points out that air bubbles provide internal corrosion in a mold in the 6th paragraph of the specification and Applicant claims "**filling of the completely closed chamber with the single quantity of liquid and then extracting a selected portion of the single quantity of liquid without allowing air to replace the extracted liquid".**

In addition, as only one side of element 2 in Fig. 3 of Osakabe is cooled, there is no possibility of uniform cooling possible with Osakabe. I.e., cooling only one side of an object, for example if element 2 was an item to mold, would fail in Osakabe since there is no mold to form element 2 in Osakabe, so simply cooling one side of element 2 fails to mold an article.

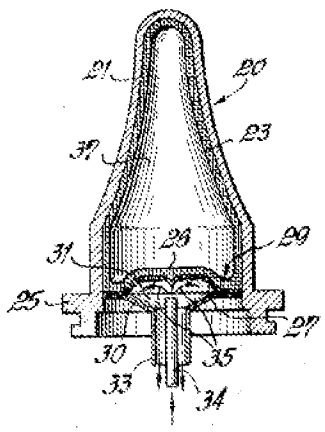
FIG. 3



Thus Applicant respectfully points out that Osakabe does not meet the limitations of Applicant's independent claims, and in general does not contemplate the unique problems associated with uniform molding temperatures that Applicant claims at least as "**wherein said molding surface comprises a separating wall or walls having a substantially uniform thickness through all of the wall or walls through which cooling is effected and wherein the level of the liquid is sufficient to cover <u>all</u> of said at least one area including said wall or walls of the chamber from which heat is to be taken and wherein**".

With respect to Sendt, the device described and claimed therein **requires** use of capillaries to wick vapor from heated areas to cool areas. Sendt does not contemplate "**wherein said molding surface comprises a separating wall or walls having a substantially uniform thickness through all of the wall or walls through which cooling is effected and wherein the level of the liquid is sufficient to cover <u>all</u> of said at least one area including said wall or walls of the chamber from which heat is to be taken and wherein**"." Sendt, rather is an example of a heat pipe. Sendt **requires** use of element 23, a capillary material, coupled to the inside of the walls as shown below. Hence there is no possible way that liquid could cover ALL of the walls, since the capillary material does and is used to transport vapor from cold areas to hot areas to affect heat transfer in a method that differs from Applicant's method.

FIG. 1



Applicant respectfully states that the invention as claimed enables for the first time a mold that provides a chamber of greatly varied shape that allows for liquid to cool walls of the mold that are of substantially uniform thickness, and which provides for example great uniformity of heat dissipation. The inventor has observed 50% reductions in cycle times, which are a great indication of the success of the invention. **Applicant respectfully believes that any invention that can perform twice as good as any other device in a field of endeavor is not only unobvious, but *very* novel.**

For at least the reasons above, Applicant submits that independent claim 33 is patentable over Osakabe in view of Sendt. Claims 34-35 depend from claim 33. Applicant respectfully submits that, for at least the reasons discussed above with respect to claim 1, claims 34-35 are patentable by virtue of their dependency. Claims 45 and 47-56 depend from claims 44 and 46. Applicant respectfully submits that, for at least the reasons discussed above with respect to independent claims 33, 44 and 46, claims 45 and 47-56 are patentable over Osakabe by virtue of their dependency.

CONCLUSION

Due to the lengthy prosecution effort on this case, Applicant respectfully requests an Examiner's Interview as per the attached Examiner's Interview Request Form. Applicant asserts that the claims as presented herein are patentable over the cited prior art for at least the reasons stated herein and are therefore in condition for allowance. Applicant respectfully requests a timely Notice of Allowance for the claims in this case.

Respectfully submitted,

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